15/07/2010

4E2917

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4E2917

B.Tech. IVth Semester (Main) Examination, June - 2010
Computer Engineering & I.T.
4CS3, 4IT3 Discrete Mathematical Structures

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five questions** selecting **one question** from **each unit**. All questions carry **equal marks**. (Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Prove the following implications are tautologies :- **(2×2=4)**
   i) $p \wedge q \rightarrow p \vee q$
   ii) $\sim p \rightarrow (p \rightarrow q)$

   b) Prove the following equivalences : **(2×2=4)**
   i) $(p \rightarrow q) \wedge (p \rightarrow r) \equiv p \rightarrow (q \wedge r)$
   ii) $(p \rightarrow r) \wedge (q \rightarrow r) \equiv (p \vee r) \rightarrow r$

   c) Write contra positive and converse of the statement "the home team wins whenever it is raining". Also construct truth table. **(8)**

OR

2. a) Explain the following with suitable example : **(2½×4=10)**
   i) Quantifiers
   ii) Conjuctive Normal forms
   iii) Disjunctive Normal forms
   iv) Contradiction.

   b) Express $f_1(p,q) = p \rightarrow ((p \rightarrow q) \wedge \sim(\sim q \vee \sim p))$ into principal disjunctive normal form. **(6)**

Unit - II

3. a) Prove that if n is an odd integer then n^2 is also an odd integer. **(6)**

   b) Prove by the principle of mathematical induction that for all positive integers $n \geq 1,\ p(n) \equiv 1+2+3+......+n = \frac{n(n+1)}{2}$ holds true. **(10)**

OR

4. a) Explain the partial correctness for the Binary search algorithm. **(8)**

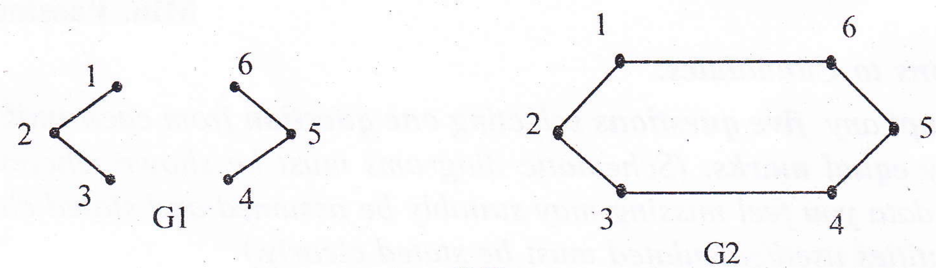
   b) Explain the constructive and non constructive proof with suitable example. **(8)**

Unit - III

5. a) Explain the following terms with examples :- **(2×4=8)**
   i) Directed and undirected graph
   ii) Degree of vertex
   iii) Bipartite graph
   iv) Path and cycles.

   b) Draw graphs which are **(2×2=4)**
   i) Both eulerian and Hamiltonian
   ii) Eulerian but not Hamiltonian.

   c) Show that the following graphs are not isomorphic. **(4)**



OR

6. a) Explain the Kruskal algorithm with example. **(8)**
   b) Define the Planer graph. Also explain the Kuratowski's theorem. **(8)**

Unit - IV

7. a) Explain pigeonhole and extended pigeonhole principle with example. **(8)**
   b) Show that the function $f : R \rightarrow R$ defined by $f(x) = ax + b,\ a \neq 0,$ is one-one. **(8)**

OR

8. a) Explain the following functions : **(2×2=4)**
   i) Floor and ceiling.
   ii) MOD and DIV functions

   b) A computer company must hire 25 programmers to handle systems programming jobs and 40 for the application programming. Of the hired persons, 10 will have to do the jobs of both types. Find out how many programmers must be hired? **(8)**

   c) Prove $n(A \cup B) = n(A) + n(B)$ for two finite sets A and B which are disjoint. **(4)**

Unit - V

9. a) Explain domain and range for a relation with example. **(6)**
   b) Show that in the set I of integers, the relation R defined by (a R b) if $a \cong b \bmod 2$ or (a-b) is a multiple of 2, is an equivalence relation. **(10)**

OR

10. a) Explain the Warshall's algorithm with example. **(8)**
    b) Explain different properties of a relation with example. **(8)**
